

Racehorse conformation and its' potential to predict animal performance

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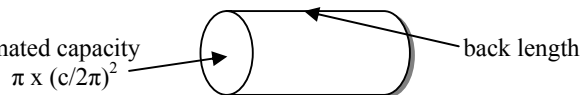
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Introduction The conformation of horses can have a large effect on their movement and performance as working animals. This is particularly important for racehorses, as various aspects of body shape can increase or decrease racing performance. For example, steep shoulders are usually a hindrance for jumping, as well as more likely to be connected to lameness problems (Holstrom, 2003). Confirmation will have different effects depending on the type of race the horse is expected to run. A horse which is smaller and more compact will not perform as well in the same races as a larger horse, and the two animals are likely to do well over different styles of jump. For example, a horse with a lower, flatter jump is more likely to do well over hurdles than steeplechase fences, as the latter are larger and more likely to throw the horse off balance (Smith Thomas, 1974). Shoulder angle may prove to be a reliable indicator of success in performance horses, as sloping shoulders enables complete flexibility of the humerus, leading to longer strides and greater speed (Smith Thomas, 1974). Horses with shorter strides have been found to be more prone to lameness in the front legs as the shorter stride length causes the legs to be under more pressure from hitting the ground more frequently (Peham *et al.*, 2001). It has been suggested that the length of the shoulder is also important (Schafer, 1981) and as it is linked to lung capacity - allowing for a deeper ribcage. The aim of this study was to compare conformation and performance in a number of racehorses.

Materials and methods Confirmation data (outside fore shoulder angle and shoulder length, back length, girth circumference (just behind the front legs) and height at the withers) was recorded on a total of 171 animals (flat racers: n=51, National Hunt racers: n=120) across 10 yards. Estimated capacity was calculated using the girth circumference (c) and back length as measurements of a circular cross-section tube (Figure 1) to give a numerical indication of heart and lung capacity (estimated capacity = $\pi \times (c/2\pi)^2 \times \text{back length}$). Every measurement was taken by the same individual and repeated 3 times to calculate and average. All racing data: rating, race type and age were obtained from the Racing Post website (www.racingpost.co.uk). Regression analysis in Minitab (Version 15) was used to examine the single and multiple relationships between ratings and body confirmation data.

Figure 1 A circular cross-section tube shape to calculate estimated capacity $\pi \times (c/2\pi)^2$ back length



Results Analysis of the data showed that the relationships between rating and confirmation was particularly strong in the flat racers but weak in the National Hunt racers and therefore the flat racers are of greater interest and relevance, hence the results discussed here are for flat racers only. Age was significantly related to rating but had a low accountable variance ($P < 0.001$, $R^2 = 21\%$) so consequent analysis was performed on subgroups selected by age as well as type of competition. Height was correlated to rating in 2 and 4 year-olds ($P < 0.01$, $R^2 = 53\%$; $P < 0.05$, $R^2 = 43\%$ respectively) whereas shoulder angle, shoulder length, back length, girth circumference and estimated capacity were not, however none of the measurements taken were correlated to rating in 3 year-olds. Rating was related to girth circumference and estimated capacity ($P < 0.05$, $R^2 = 38$, $P < 0.05$, $R^2 = 39\%$) in the oldest group comprising of 5, 6, 7 and 8 year olds. When including multiple measurements, rating was strongly related to height, shoulder angle and shoulder length ($P < 0.05$, $R^2 = 80\%$) in four year-olds and to height, shoulder length, back length, girth circumference and estimated capacity ($P < 0.01$, $R^2 = 96\%$) in the oldest group.

Conclusions Body shape is important in flat racers only where a higher rating is achieved by the larger horse which is in agreement with Smith Thomas (1974), however the age of the animal was important. This disagrees with Holstrom (2001) who believed that the conformation – performance relationship was set as young as 8 months of age. This work represents a snap shot of data collection at one time point, further research is necessary, however ultimately if this approach worked the results could be used to predict racing success of individual animals.

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References

- Holstrom M 2001. Equine Locomotion. Harcourt Publishers Limited. London, UK.
- Holstrom M 2003. How do we recognise the elite show jumper? Lensing Druck. Dortmund, Germany.
- Peham C, Licka T, Girtler D and Scheidl M 2001. The Veterinary Journal 162, 153-157.
- Schafer M 1981. An eye for a horse J.A. Allen. London, UK.
- Smith Thomas H 1974. Horses: Their breeding, care and training. A.S. Barnes and Co Inc. New Jersey, USA.